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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

ED 062410

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

PRESSER, MACHINE (any ind.; laund.) 7-57.511

B-410 or S-146

U. S. Employment Service in
Cooperation with
California, Colorado, Idaho, Oregon, Utah, and Washington State Employment Services

TM 001 278

U. S. DEPARTMENT OF LABOR
Bureau of Employment Security
Washington 25, D. C.
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April 1957

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY FOR PRESSER, MACHINE 7-57.511

B-410 or S-146

Summary

The General Aptitude Test Battery, B-1002A, was administered to 51 women employed as Presser, Machine 7-57.511 at American Linen Supply Company, plants in various locations. The criterion consisted of supervisory ratings made on a descriptive rating scale. On the basis of the statistical and qualitative analysis of the data, Aptitudes K-Motor Coordination, F-Finger Dexterity, and M-Manual Dexterity were selected for inclusion in the test norms.

GATB Norms for Presser, Machine 7-57.511 - B-410 or S-146

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Presser, Machine 7-57.511.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-410 or S-146

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
T	CB-1-G CB-1-K	75	K	Part 8	80
F	CB-1-O CB-1-P	75	F	Part 11 Part 12	70
M	CB-1-M CB-1-N	80	M	Part 9 Part 10	80

Effectiveness of Norms

The data in Table IV indicate that 10 of the 15 poor workers, or 67 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 67 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 25 of the 30 workers who made qualifying test scores, or 83 percent, were good workers.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Presser, Machine 7-57.511.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered during the period July 1953 to April 1957 to 96 women employed as Presser, Machine 7-57.511 at the American Linen Supply Company plants in various locations. The location of each plant, number tested in each plant, dates of testing, number eliminated from each sample and reasons for eliminating them are as follows:

Boise, Idaho - two were tested in April 1955; none were eliminated.

Chicago, Illinois - 30 tested during February and March 1956. This entire group was eliminated because it appeared that the test scores were not valid. The Chicago Agency eliminated 16 from the sample group because of education, experience, or inability to obtain a complete profile on them, and they reported that the entire sample group had difficulty manipulating the separate answer sheets. In a trial analysis it was found that the means of each aptitude with the exception of Aptitudes P, F, and M for the remaining 14 women were significantly below the means of the other sample groups of the experimental sample. Therefore, it seemed as though these scores were obtained from a different population than the other sample groups.

Denver, Colorado - 7 tested July 11, 1955; 2 were eliminated because of age.

Long Beach, California - 10 tested February 8, 1957; 3 were eliminated because of age (one of these was also a supervisor and was not actually doing the work of a presser); 1 was eliminated because she did not have her glasses at the time of testing, and it appeared that her scores were not valid.

Ogden, Utah - 1 tested in June 1956.

Portland, Oregon - 6 tested in May 1955; none eliminated.

Salt Lake City, Utah - 1 tested in July 1954; 19 in August 1953; 2 in September 1953, 4 in May 1956. One was eliminated because she lacked the required six years of education, 2 because of age, and 4 because of serious language difficulties.

Spokane, Washington - 10 tested April 9, 1957; 2 eliminated because of age.

Tacoma, Washington - 4 tested July 26, 1955; none eliminated.

Of the 96 women tested, 45 were eliminated. Thus, the final experimental sample consisted of 51 women.

Entrance requirements for this job vary with the different plants. The larger plants usually will hire inexperienced applicants between the ages of 18 and 30. The smaller plants may go beyond this limit. There are no set requirements for education. Some of the plants prefer experienced workers; others prefer to train their own pressers. An inexperienced applicant is usually given about one week of training on the job, under close supervision. The worker is given a period of up to 10 weeks to build up speed to the point where she is earning the minimum piece rate guarantee. All workers in the sample perform similar pressing tasks with the exception that leggers and and sleevers are not used at the Long Beach and Denver plants. All the workers in the sample are considered experienced workers.

Table II shows the means, standard deviations, ranges, and Pearson product-moment correlations with the criterion for age, education and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

Presser, Machine 7-57.511
N = 51

	M	σ	Range	r
Age (years)	39.1	8.9	20-54	-.158
Education (years)	9.3	2.0	3-12	.100
Experience (months)	73.1	53.5	9-242	.180

There are no significant correlations between age, education, or experience and the criterion. All workers in the sample except one (tested at the Tacoma plant) had a minimum of six years of education. The Washington Agency reported that the one worker with 3 years of education had no difficulty with the test material during the testing session, and her scores were not different from other workers in the sample group.

The data in Table II indicate that the sample is suitable for test development purposes with respect to age, education, and experience.

III. Job Description

Job Title: Presser, Machine 7-57.511

Job Summary: Tends a set of pressing machines of various combinations of flat-beds, leggers, sleevers, and yokers. Smooths the surfaces of uniforms, gowns, and coveralls with pressing machine to shape the articles, to remove wrinkles, and to flatten seams.

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Work Performed: Lifts article from basket of clean damp-dried linen, spreads article on buck of machine, dampens dry spots by spraying with a fine water nozzle and closes pressing head of machine by pushing two air powered switches. Releases press by pushing an air switch and rearranges article, repeating until required pressing is done.

Contracts coverall sleever by pressing foot pedal, spreads sleeves of coveralls over sleever and releases pedal allowing sleever to expand against coverall until sleeves are pressed. Contracts coverall legger by pressing pedal with foot, spreads legs of coveralls over legger and releases pedal allowing legger to expand until required pressing is done.

Removes pressed article from machine, hangs on wire hanger, and attaches hanger to rotating shaft-type conveyor which moves pressed article to folding room.

IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings made on a descriptive rating scale. The rating scale covered five ratable traits: speed, accuracy, skill, knowledge of own and related operations, and versatility. Each trait had a range of values from 1 to 5. A rating of 1 indicated very low performance on the trait and a rating of 5 indicated very high performance.

Ratings were obtained by two methods. In the plants where two supervisors were acquainted with all the tested workers, each supervisor rated the workers independently. In plants where only one supervisor knew the workers, two separate ratings, made at two-week intervals were obtained. The two sets of ratings were combined to form one set of criterion scores from each plant. The first ratings for the 19 workers in the different plants who were rated and rerated by one supervisor were combined with the first line supervisory ratings for the 32 workers in the different plants who were rated by two different supervisors to obtain a single distribution on ratings for the 51 workers. The second ratings for the group of 19 workers in the different plants were combined with the second line supervisory ratings for the group of 32 workers in the different plants, which resulted in a second distribution of ratings for 51 workers. The correlation between the two distributions of ratings was .77. The reliability of the combined ratings, as estimated by the Spearman-Brown prophecy formula, was .81. The total of the two supervisory ratings on the Descriptive Rating Scale, Form SP-21, for each worker was used as the final criterion to maximize the reliability of the criterion data.

VI. Statistical and Qualitative Analyses

A. Statistical Analysis:

Table III shows the means, standard deviations, and Pearson product-moment correlations with the criterion for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general working population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Presser, Machine 7-57.511
N = 51

Aptitudes	M	σ	r
G-Intelligence	87.7	14.9	.199
V-Verbal Aptitude	90.0	15.4	.102
N-Numerical Aptitude	82.1	16.2	.319*
S-Spatial Aptitude	91.4	18.8	.085
P-Form Perception	86.1	20.8	.127
Q-Clerical Perception	90.1	12.8	.194
K-Motor Coordination	91.6#	14.4	-.081
F-Finger Dexterity	92.7#	19.9	.311*
M-Manual Dexterity	98.5#	20.3	.308*

* Significant at the .05 level
\# Relatively High Mean Score

The highest mean scores in descending order of magnitude were obtained for aptitudes M, F, and K. All the aptitudes, except Aptitudes P and M have standard deviations of less than 20. Aptitude Q has the lowest standard deviation.

For a sample of 51 cases, correlations of .358 and .276 are significant at the .01 level and the .05 level of confidence, respectively. Aptitudes N, F, and M correlate significantly with the criterion at the .05 level.

B. Qualitative Analysis:

The statistical results were interpreted in the light of the job analysis data. The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Form Perception (P) - required to shape and to place articles properly in pressing machine to insure smooth press.

Motor Coordination (K), Finger Dexterity (F), and Manual Dexterity (M) - required to rapidly and accurately place articles on the machines; to smooth articles so that no wrinkles will be pressed into the fabrics; to pick up and rearrange articles on different shaped bucks; to open and close the pressing heads; and to rapidly hang articles on hangers.

C. Selection of Test Norms:

Based on the quantitative and qualitative evidence cited above, Aptitudes K, F, and M warranted further consideration for inclusion in the test norms. The evidence for each of these aptitudes is indicated below.

Aptitude	Relatively High Mean Score	Significant Correlation with Criterion	Importance Indicated by Qualitative Analysis
K	X		X
F	X	X	X
M	X	X	X

Although Aptitude N showed significant correlation with the criterion and Aptitude P appeared to be important on the basis of the job analysis data, these aptitudes were not considered further for inclusion in the test norms because there was no other qualitative or quantitative evidence of significance.

Various combinations of Aptitudes K, F, and M, with appropriate cutting scores were selected as trial norms. The relationship between each set of trial norms and the criterion (dichotomized as indicated in section VII) was determined.

A comparison of the results showed that norms consisting of K-80, F-70, and M-80 for B-1002 and equivalent norms of T-75, F-75, and M-80 for B-1001 had the best selective efficiency.

In test development studies an attempt is made to develop a set of norms such that the cutting score for each aptitude included in the norms will be set at a five-point score level close to one standard deviation below the aptitude mean of the experimental sample. Adjustments of cutting scores from one standard deviation below the mean are made to effect better selective efficiency of the norms. In this study the aptitude cutting scores are each within 5 points of one standard deviation below the aptitude mean of the sample.

VII. Concurrent Validity of Norms

For the purpose of computing the tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test, the criterion was dichotomized so that approximately one-third of the sample could be in the low criterion group. This was accomplished by using a descriptive rating scale score of 33 as the criterion critical score, and resulted in 15 of the 51 workers, or 29 percent of the sample, being placed in the low criterion group.

Table IV shows the relationship between test norms consisting of Aptitudes K, F, and M with critical scores of 80, 70, and 80, respectively, and the dichotomized criterion for Presser, Machine 7-57.511. Workers in the high criterion group have been designated as "good workers," and those in the low criterion group as "poor workers."

TABLE IV

Relationship between Test Norms Consisting of Aptitudes K, F, and M with Critical Scores of 80, 70, and 80, Respectively, and the Criterion for Presser, Machine 7-57.511

N = 51

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	25	36
Poor Workers	10	5	15
Total	21	30	51

$r_{tet} = .54$ $\qquad$ $X^2 = 4.307$

$\sigma_{r_{tet}} = .23$ $\qquad$ $P/2 < .025$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes K, F, and M with minimum scores of 80, 70, and 80, respectively, are recommended as B-1002 norms for the occupation of Presser, Machine 7-57.511. The equivalent B-1001 norms consist of T-75, F-75, and M-80.

IX. Determination of Occupational Aptitude Pattern

When the specific test norms for an occupation include three aptitudes, only those occupational aptitude patterns which include the same three aptitudes with cutting scores that are within 10 points of the cutting scores established for the specific norms are considered for that occupation. The only one of the existing 23 occupational aptitude patterns which meets these criteria for this study is OAP-17 which consists of K-85, F-80, and M-80 for B-1002 and T-80, F-85, and M-85 for B-1001. The selective efficiency of OAP-17 for this sample was determined by means of the tetrachoric correlation technique. The tetrachoric correlation between OAP-17 and the dichotomized criterion for this sample did not indicate a significant relationship. Therefore, none of the existing occupational aptitude patterns is recommended for the occupation covered by this study. However, the data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.